510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE ONLY

A. 510(k) Number:
k040467

B. Analyte:
Uric acid

C. Type of Test:
Quantitative

D. Applicant:
Clinical Data, Inc

E. Proprietary and Established Names:
Vitalab Uric Acid Reagent

F. Regulatory Information:

1. Regulation section:
   21 CFR 862.1775
2. Classification:
   Class I
3. Product Code:
   KNK
4. Panel:
   75

G. Intended Use:

1. Indication(s) for use:
   Vitalab Uric Acid Reagent is intended for use with the Vitalab Selectra Analyzer as a system for the quantitative determination of uric acid in serum and plasma. Uric acid results may be used for the diagnosis and treatment of numerous renal and metabolic disorders, including renal failure, gout, leukemia, psoriasis, starvation or other wasting conditions, and of patients receiving cytotoxic drugs.
2. Special condition for use statement(s):
   Prescription use
3. Special instrument Requirements:
   The Vitalab Uric Acid Reagent is intended to be used with the Vitalab Selectra E Chemistry Analyzer.

H. Device Description:
The Vitalab Uric Acid Reagent and the Vitalab Selectra Analyzer are used as a system for the quantitative analysis of uric acid in serum and plasma. The Vitalab Uric Acid Reagent is intended to

be calibrated with the Vitalab Serum Calibrator and is supplied as a two liquid-stable component. The sample may be added to the first reagent component allowing for sample blank reading before the addition of the start reagent. Uric acid concentrations are calculated from the change in absorbance at 546 nm after the completion of the reaction.

I. Substantial Equivalence Information:

1. Predicate device name(s):
   Roche Uric Acid Plus Reagent Kit, product 1661850
2. Predicate K number(s):
   k873363
3. Comparison with predicate

Similarities		
Item	**Vitalab Uric Acid**	**Roche Uric Acid Plus**
Intended Use	Similar	Similar
Type of test	Quantitative	Quantitative
Principle	Enzymatic oxidation by uricase with TOOS/peroxidase indicator system	Similar
Measurement	Enzymatic endpoint at approximately 550 nm (546 nm)	Similar
Differences		
Item	**Vitalab Uric Acid**	**Roche Uric Acid Plus**
Sample type	Serum, plasma	Serum, plasma and urine
Analytical range	0.1 to 25 mg/dL	0.2 to 25 mg/dL

J. Standard/Guidance Document Referenced (if applicable):

NCCLS EP3-T, NCCLS EP7-P

K. Test Principle:

The Vitalab Uric Acid Reagent determines uric acid through enzymatic oxidation by uricase linked to a Trinder indicator reaction utilizing N-ethyl-N-(hydroxy-3-sulfopropyl)-toluidine (TOOS) and 4-aminoantipyrine. The resulting increase in absorbance at 546 nm is proportional to the uric acid concentration of the sample.

L. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Precision is demonstrated by the replicate assay of commercially available control serum. Each sample is assayed in triplicate twice per day over 10 days using the Vitalab Uric Acid Reagent on a Selectra E Analyzer. Precision statistics, calculated analogous to the method described in NCCLS Guideline EP3-T, are shown below.

Precision of Uric Acid Recoveries in mg/dL

		Within Run			Total	
Sample	n	mean	1SD	%CV	1SD	%CV
Serum 1	60	2.5	0.02	0.7%	0.04	1.6%
Serum 2	60	6.8	0.04	0.7%	0.09	1.4%
Serum 3	60	11.1	0.07	0.6%	0.13	1.2%

b. Linearity/assay reportable range:

The linear range of the assay is from 0.1 to 25.0 mg/dL. Ten standards ranging from 0.0 to 30.0 mg/dL are prepared by dissolving uric acid in an ammonium hydroxide matrix to span the linear range of the application. These standards are assayed on a Vitalab Selectra in ascending order over four independently calibrated analytical runs. Standard recoveries are compared to standard concentrations by least squares linear regression through the origin. A residual statistic is calculated for each standard as the difference between the mean recovery and its predicted value from the regression statistics.

The maximum residual is 0.1 mg/dL uric acid indicating linearity throughout the linear range.

c. Traceability (controls, calibrators, or method):
Calibrator set points are traceable to NIST SRM 913.

d. Detection limit:
Normal saline is assayed thirty times in a single analytical run. The detection limit is calculated as the mean plus two standard deviations of the results. The observed mean and standard deviation are both 0.0 mg/dL. The detection limit of the assay is 0.1 mg/dL uric acid, which is the round-off error of the assay.

e. Analytical specificity:
Potential interference from ascorbic acid, icterus (bilirubin), hemolysis (hemoglobin) and lipemia (triglycerides) is determined in four separate studies. In each study, a serum pool with approximately normal uric acid levels is prepared from individual patient specimens and is divided into two aliquots. One aliquot is spiked with the potential interfering substance. The other aliquot is diluted with normal saline, if necessary, to mimic the dilution the spiked pool. These aliquots are then blended to prepare test pools with the interferant concentrations listed below. The red blood cell (RBC) hemolysate, which is used to spike the high pool for the hemolysis test, is prepared from at least five patient specimens according to the Osmotic Shock Procedure described in NCCLS Document EP7-P, Volume 6 No.13.

Interfering Substance	Levels tested
Ascorbic acid	0.6, 1.2, 1.8, 2.4, 3.0 mg/dL
Ditaurobilirubin	8, 16, 24, 32, 40 mg/dL (as bilirubin)
RBC hemolysate	40, 80, 120, 160, 200 mg/dL (as hemoglobin)
Intralipid, 20%	400, 800, 1,200, 1,600 and 2,000 mg/dL (as triglycerides)

Each set of original and spiked pools are assayed in an alternating order 9 and 6 times respectively in a single analytical run. Differences in recoveries between the original and spiked pools are reported with t-statistics. Statistically significant differences greater than 0.25 mg/dL are reported on the package insert.

Ascorbic acid has no effect on recoveries. Bilirubin at 8 and 24 mg/dL suppresses recoveries approximately 0.4 and 1.3 mg/dL respectively. Red blood cell hemolysate added to a hemoglobin concentration of 160 mg/dL decreases recoveries by 0.3 mg/dL. The addition of Intralipid to 800 mg/dL triglycerides does not affect uric acid results. However, at 1,200 and 2,000 mg/dL triglycerides, uric acid results are suppressed by 0.7 and 3.4 mg/dL respectively.

f. Assay cut-off:

Not applicable

2. Comparison studies:

a. Method comparison with predicate device:

Random specimens from individual anonymous adult patients are collected from local clinical labs. These unaltered samples are supplemented with additional specimens with elevated uric acid levels to yield a total of 60 serum and 60 heparinized plasma specimens. These specimens are randomly assorted into groups of 15 serum and 15 plasma specimens each. One group of serum and plasma specimens are assayed in each of four runs using the Vitalab Selectra Uric Acid Application and the Roche Uric Acid Plus Reagent on the Hitachi 704 after calibrating each reagent with its required calibrator.

The serum results, plasma results and the combined results for both specimen types are each compared by Deming regression assuming equal variances between methods. Regression statistics are given below.

Serum Correlation

	Value	95% Confidence Interval
Intercept	-0.08 mg/dL	-0.18 to 0.018 mg/dL
Slope	1.0064	0.990 to 1.022
$s_{y.x}$	0.07 mg/dL	
n	60	
range	3.6 to 10.2 mg/dL	

Plasma Correlation

	Value	95% Confidence Interval
Intercept	-0.01 mg/dL	-0.10 to 0.07 mg/dL
Slope	0.9840	0.969 to 0.999
$s_{y.x}$	0.09 mg/dL	
n	60	
range	2.1 to 10.6 mg/dL	

Combined Correlation

	Value	95% Confidence Interval
Intercept	-0.05 mg/dL	-0.11 to 0.02 mg/dL
Slope	0.9954	0.984 to 1.007
$s_{y.x}$	0.08 mg/dL	
n	120	
range	2.1 to 10.6 mg/dL	

Where x = Competitive Reagent Results
y = Selectra Results

b. Matrix comparison:
Serum and plasma specimens are individually compared to the predicate method by Deming regression. The substantial overlap in the 95% confidence intervals of the regression statistics indicates equivalency between the two matrices.

3. Clinical studies:
   a. Clinical sensitivity:
   Not applicable
   b. Clinical specificity:
   Not applicable
   c. Other clinical supportive data (when a and b are not applicable):
   Not applicable
4. Clinical cut-off:
   Not applicable
5. Expected values/Reference range:
   Reference ranges are established in the literature and quoted from Tietz Textbook of Clinical Chemistry, Third Edition, Burtis and Ashwood, editors, W. B. Saunders Company (1999). The expected values are 3.5 to 7.2 mg/dL for males and 2.6 to 6.0 mg/dL for females.

M. Conclusion:

Based upon a Third Party Review of the information provided in this 510(k), this device is substantially equivalent to devices regulated by 862.1775, acid, uric, uricase (colorimetric); Class I.